

What is claimed is:

1 A system for inserting an electronic watermark data comprising:

DCT converter for extracting a block of  $k \times k$  pixels from an original image, subjecting said block to DCT (discrete cosine transform), and then outputting data after the DCT conversion;

quantizer for quantizing DCT coefficients output from said DCT converter;

movement decision means for deciding the magnitude of a movement based on a generation amount from said DCT converter;

picture-type decision means for deciding a picture type;

an electronic watermark data table for storing first to  $j$ -th electronic watermark data and electronic watermark data of  $(j \times 2)$  types having said movement, for each picture type;

electronic watermark data selector for selecting said electronic watermark data of one type according to said picture type and said movement; and  
electronic watermark data inserter means for inserting said selected electronic watermark data into data after said DCT conversion;

whereby the magnitude of a movement is decided by

obtaining a difference between a DCT coefficient of a front frame and a DCT coefficient of a rear frame and electronic watermark data with a suitable strength is inserted according to the magnitude of said movement.

5 2 A system for inserting an electronic watermark data comprising:

DCT converter for extracting a block of  $k \times k$  pixels from an original image, subjecting said block to DCT (discrete cosine transform), and then outputting data after the DCT conversion;

quantizer means for quantizing DCT coefficients output from said DCT converter means;

movement decision means for deciding the magnitude of a movement based on a generation amount from said DCT converter means;

picture-type decision means for deciding a picture type;

original electronic watermark data memory for storing original electronic watermark data;

j first multipliers each for subjecting said original electronic watermark to multiplication data according to said picture type;

an electronic watermark data table for storing electronic watermark data of j types ranging from the first electronic watermark data to j-th electronic


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 watermark data being outputs from said  $j$  multipliers;  
 electronic watermark data selector for selecting  
 electronic watermark data of one type among said  
 electronic watermark data of  $j$  types;

5 a second multiplier for subjecting said selected  
 electronic watermark data to multiplication according  
 to the magnitude of a movement obtained based on a  
 difference between said DCT coefficients; and  
 electronic watermark data insertion means for inserting  
 10 electronic watermark data obtained through  
 multiplication by said second multiplier into data  
 after said DCT conversion;

whereby the magnitude of a movement is decided by  
 obtaining a difference between a DCT coefficient of a  
 15 front frame and a DCT coefficient of a rear frame and  
 electronic watermark data with a suitable strength is  
 inserted according to the magnitude of said movement.

3 A Apparatus for inserting an electronic watermark data  
 comprising:

20 a DCT converter for extracting a block of  $k \times k$  pixels  
 from an original image, subjecting said block to DCT  
 (discrete cosine transform), and then outputting data  
 after the DCT conversion;  
 a quantizer for quantizing DCT coefficients output from  
 25 said DCT converter;

  
 a movement decision unit for deciding the magnitude of  
 a movement based on a generation amount from said DCT  
 converter;

a picture-type decision unit for deciding a picture  
 type;

an electronic watermark data table for storing first to  
 j-th electronic watermark data and electronic  
 watermark data of  $(j \times 2)$  types having said movement,  
 for each picture type;

an electronic watermark data selector for selecting  
 said electronic watermark data of one type according  
 to said picture type and said movement; and

an electronic watermark data inserter for inserting  
 said selected electronic watermark data into data  
 after said DCT conversion;

an inverse quantizer for inverse-quantizing a block of  
 $k \times k$  pixels in which said electronic watermark data  
 is inserted; and

an IDCT covnerter for performing an IDCT (discrete  
 cosine transform) of a block of  $k \times k$  pixels in  
 which said electronic watermark data inverse-  
 quantized is inserted.

4 An apparatus for inserting an electronic watermark data  
 comprising:

a DCT converter for extracting a block of  $k \times k$  pixels

from an original image, subjecting said block to DCT  
 (discrete cosine transform), and then outputting data  
 after the DCT conversion;  
 a quantizer for quantizing DCT coefficients output from  
 said DCT converter;  
 a movement decision unit for deciding the magnitude of  
 a movement based on a generation amount from said DCT  
 converter;  
 a picture-type decision unit for deciding a picture  
 type;  
 an electronic watermark data table for storing first to  
 j-th electronic watermark data and electronic  
 watermark data of  $(j \times 2)$  types having said movement,  
 for each picture type;  
 an electronic watermark data selector for selecting  
 said electronic watermark data of one type according  
 to said picture type and said movement; and  
 an electronic watermark data inserter for inserting  
 said selected electronic watermark data into data  
 after said DCT conversion; and  
 a Huffman encoder for encoding data after insertion of  
 said electronic watermark data.

5 An apparatus for inserting an electronic watermark data  
 comprising:

a DCT converter for extracting a block of  $k \times k$  pixels

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from an original image, subjecting said block to DCT (discrete cosine transform), and then outputting data after the DCT conversion;

5 a quantizer for quantizing DCT coefficients output from said DCT converter;

a movement decision unit for deciding the magnitude of a movement based on a generation amount from said DCT converter;

10 a picture-type decision unit for deciding a picture type;


original electronic watermark data storage means for storing original electronic watermark data;

15 j first multipliers each for subjecting said original electronic watermark to multiplication data according to said picture type;

an electronic watermark data table for storing electronic watermark data of j types ranging from the first electronic watermark data to j-th electronic watermark data being outputs from said j multipliers;

20 an electronic watermark data selector for selecting electronic watermark data of one type among said electronic watermark data of j types;

25 a second multiplier for subjecting said selected electronic watermark data to multiplication according to the magnitude of a movement obtained based on a



5 difference between said DCT coefficients; and  
an electronic watermark data inserter for inserting  
electronic watermark data obtained through  
multiplication by said second multiplier into data  
after said DCT conversion;  
an inverse quantizer for inverse-quantizing a block of  
k × k pixels in which said electronic watermark data  
is inserted; and  
an IDCT covnerter for performing an IDCT (discrete  
10 cosine transform).

6 The apparatus for inserting an electronic watermark  
data defined in Claim 5, wherein said first multiplier and  
said second multiplier are omitted when said  
multiplication coefficient is 1.

15 7 An apparatus for decoding an electronic watermark data  
comprising:  
a decoder for extracting and decoding block data of a  
size of k × k pixels decoded by the electronic  
watermark data inserter;  
20 an IDCT converter for IDCT converting said block data  
decoded;  
an electronic watermark data extractor for obtaining  
the number of electronic watermark data to be  
extracted based on information on the location where  
25 said block data of a k × k pixel size is extracted

and then extracting electronic watermark data from  
data after IDCT conversion output from said IDCT  
converter;

5        extracted data storage means for storing data extracted  
by said electronic watermark data extractor; and  
an electronic watermark data detector for extracting  
electronic watermark data at a corresponding location  
by means of said extracted data storage means and  
said electronic watermark table after said extracted  
10       data storage means has stored extracted data for one  
screen and then calculating a statistical similarity,  
thus outputting a calculation result.